SVKM's
D. J. Sanghvi College of Engineering

Program: B.Tech in Electronics & Telecommunication Engg **Academic Year: 2022** **Duration: 3 hours**
Date: 10.01.2023
Time: 10:30 am to 01:30 pm
Subject: Radio Frequency Circuit Design (Semester V) **Marks: 75**

Instructions: Candidates should read carefully the instructions printed on the question paper and on the cover page of the Answer Book, which is provided for their use.
(1) This question paper contains two pages.
(2) All Questions are Compulsory.
(3) All questions carry equal marks.
(4) Answer to each new question is to be started on a fresh page.
(5) Figures in the brackets on the right indicate full marks.
(6) Assume suitable data wherever required, but justify it.
(7) Draw the neat labelled diagrams, wherever necessary.
(8) Use Smith chart and data tables wherever required.

Question No.		Max. Marks
Q1 (a)	A transmission line of characteristic impedance Z_0=50 Ω and length d=0.15λ is terminated in a load impedance of Z_L = (25 – j30) Ω. Find Γ_0, Zin(d) and SWR by using Z-Smith chart.	[10]
	OR	
	Show one to One mapping between the normalized impedance plane and the reflection coefficient plane using relevant equations.	[10]
Q1 (b)	Why S-parameters are used at high frequencies? Define S-parameters.	[05]
	OR	
	What is Tapered transmission line? Explain in brief Exponential Taper	[05]
Q2 (a)	Design two element lumped element L section matching network at 500 MHz to transform Z_L = (200 – j100) Ω to a 100 Ω transmission line. Use Z-smith chart. (Designed L section must have capacitor in shunt with Z_L)	[10]
	OR	
	Write short note on Binomial Multi Section Transformer. List the design steps for a Binomial matching network.	[10]
Q2 (b)	From the definition equations for the impedance and admittance matrices, show that $[Z] = [Y]^{-1}$	[05]

	OR Compare different impedance transformers.	[05]
Q3 (a)	Explain with relevant formulas, the image parameter method of LPF design. **OR** Design a prototype low pass Butterworth filter that will provide atleast 20 dB attenuation at the frequency of $f=2f_{3dB}$.	[10] [10]
Q3 (b)	Explain frequency transformation and impedance transformation in filter design. **OR** Write short note on chip components.	[05] [05]
Q4 (a)	Explain RF behaviour of high frequency resistor, capacitor and inductor. **OR** Explain SMT manufacturing process in detail.	[10] [10]
Q4 (b)	Compare Image parameter method and Insertion loss method of filter design. **OR** Define unit element and its role in filter design.	[05] [05]
Q5 (a)	Match a load $Z_L = (25 + j75)\ \Omega$ to 50Ω at 10GHz using L-section on Z- Smith chart. **OR** State and prove Kuroda's first two identities.	[10] [10]
Q5 (b)	Compare Butterworth filter and Chebyshev filter. **OR** Compare LC- section matching and Quarter wave transformer matching.	[05] [05]

All the Best!